Space Weather Forecast

Issued on Saturday 28 December 2024 at 12:32 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate radio blackouts (R1/R2) likely throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Moderate, with three isolated Moderate flares, peaking at 28/1121 UTC from a region in the southwest of the disc.

There are approximately 13 sunspot regions on the Earth-facing side of the Sun. Of these, there are five main sunspot regions, all of which are magnetically complex. The remaining spots are smaller and simpler and pose less of a risk of notable flare activity through the period.

The current southern hemisphere far side is proving a fertile breeding ground for Coronal Mass Ejections (CMEs), with a good many observed past 3-days, most of which heading south, and later southeast from the far side, implying the presence of a large and active region here - potentially of note into the New Year period.

No Earth-directed CMEs have been observed leaving the solar disc in the past 24 hours. Although a number of filament eruptions or disruptions were observed on available imagery, none of these are anticipated to have produced CMEs of note.

Solar Wind / Geomagnetic Activity: Solar winds showed a slow regime, with background solar wind speeds declining through the period, and unremarkable measures for the numbers of particles passing Earth and their associated magnetic field. The net result of the above solar wind measures was provisionally quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: High energy proton flux (greater than 10MeV) at GOES18 showed a continuing gradual decline below 1pfu, well below the 1-pfu S1/Minor Radiation Storm threshold.

Four-Day Space Weather Forecast Summary

Solar Activity: Occasional Moderate-class flares are Likely, with a Slight Chance of isolated Strong-class flares throughout. The arrival of one or more significant active regions across the eastern horizon Days 2-4 (29-31 Dec) increases the risk of more frequent and significant flare activity.

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Solar Wind / Geomagnetic Activity: No 'coronal hole' fast winds nor CMEs currently feature in the forecast. Confidence remains low in the possibility of any glancing blows from CMEs during the period due to the weight of numbers of recent CME events across the whole Sun.

Geomagnetic activity is expected to be mainly Quiet (Kp 0-2), but with a Slight Chance of Active (Kp 4) intervals should any glancing CME effects occur - perhaps more probable on Days 1-2 (28-29 Dec).

Energetic Particles / Solar Radiation: There is a Slight Chance of S1/Minor Radiation Storm or greater enhancements during the period. The risk slightly increases later in the period as significant sunspot regions rotate into a more favourable position.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	5	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	70	70	70	80
Very Active	R3-R5 (X Class)	No	10	10	10	15

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	10	15	15
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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